

THE FLORA OF PATAGONIA<sup>1</sup>

THIS work, the joint production of the late Prof. Lorentz and of Mr. G. Niederlein, is a substantial addition to our knowledge of the vegetation of one of the least explored portions of the earth. It forms one portion of the scientific results of the expedition into Patagonia conducted in 1879 by General Roca, who has since been elected President of the Argentine Confederation. The Indians who, under the vigorous and stern administration of General Rosas, had been terrified into inaction, if not into submission, gradually took courage when they had to deal with less energetic opponents. At repeated intervals the wandering tribes, especially those of Araucanian stock, made destructive incursions through North Patagonia and the south of the province of Buenos Ayres, massacring the white settlers and driving off the cattle. It had long been the declared policy of the Argentine Government to confine the Indians to the region south of the Rio Negro, by establishing military posts at suitable points in the valley of that river; and to carry out this project was the object of General Roca's expedition. The chief station occupied was Cholochele, a large island inclosed by two arms of the Rio Negro. From thence the upper valley of that river was followed to its junction with a large tributary, the Nauquem. Prof. Lorentz had already returned to Buenos Ayres, while Mr. Niederlein travelled northward to Mendoza. Although the expedition was carried out at an unfavourable season—the autumn and early winter of the southern hemisphere—the authors succeeded in collecting 337 species, of which thirteen are ferns and the remainder flowering plants, in a district which includes only the north-western portion of Patagonia. It is not, however, easy to say how many of the numerous species not hitherto recorded as natives of Patagonia are henceforward to be added to its scanty flora. Many of the species recorded were found in the region lying north of the Rio Colorado, which is generally regarded as the northern boundary of Patagonia, and are not said to spread to the south of that river. Again, as many as sixty-five species of flowering plants were collected in such an imperfect condition that the authors have not been able to assign to them specific names, and many of these will doubtless be found identical with those already known as natives of the country. Further, it must be added that, of twenty plants described as new species, several appear to rest upon slight distinctive characters, which, in the eyes of many experienced botanists, will entitle them to be counted rather as varieties than as altogether new species.

Making due allowance for these deductions, it appears that we may reckon about 150 species as additions to the meagre catalogue of the plants hitherto known as indigenous to Patagonia, scarcely 300 in number for a territory more than 1000 miles in length and from 200 to 400 in breadth. Apart from the interest felt by the systematic botanist in the special forms of vegetation displayed in each region of the earth, many questions of a more general character are suggested by the study of local floras, and that of Patagonia is especially suggestive. Ever since naturalists ceased to regard the existence of each organism as due to a special and separate act of creation, and have learned that the existing population of each region is derived by descent with modification from earlier races, the influence of geological and physical changes has assumed a paramount importance in regard to all changes relating to the geographical distribution of plants and animals. If we seek to understand how the flora of a given region of the earth has come to be what it is, our first business is to inquire into the past history of that region, and to ascertain from what sources the indigenous species may have been derived. With

reference to the special features of the Patagonian flora, the subject was discussed during the past winter at a meeting of the Linnean Society. It was then pointed out that nearly the whole of Patagonia and a considerable part of the adjoining Argentine territory had been raised from beneath the sea-level during the latest geological period, and that the only quarters from which the vegetable population could be derived were either the range of the Andes or the subtropical region now included in the northern Argentine provinces. It was argued that the exceptional poverty of the Patagonian flora is not mainly due to climatal conditions, but to the fact that in the time which has elapsed since its upheaval only a relatively small proportion of the plants of the adjoining regions had been modified to suit the conditions of life in the newly-formed territory.

It is interesting to see what light is thrown on the subject by the present work, which, although bearing the date 1881, appears to have but very recently reached this country. Our previous knowledge of the flora was nearly confined to the region near the coast, whereas most of the plants here enumerated come from the territory near the eastern base of the Cordillera. Whether owing to the season, or to the fact that they do not extend to the interior, many of the indigenous species known to occur near the coast—at least a hundred might be enumerated—are absent from the enumeration of MM. Lorentz and Niederlein. But a comparison of all the materials accessible displays a remarkable degree of uniformity in the general features of the vegetation. When raised from the sea the newly-formed territory of Patagonia was dependent for a vegetable population on the immigrant species which it might receive either from the range of the Cordillera to the west, or from the subtropical region to the north. As a matter of fact the predominant features of the vegetation are derived from the lower zone of the Andes, the majority of the species being either the same or slightly modified forms of plants of that zone. Our knowledge of the eastern slopes of the Andes in Patagonia is so imperfect that we cannot say whether a few apparently very distinct plants, two of which are here described as types of new genera under the names *Niederleinia* and *Grisebachiella*, are derived from the higher zone of that range; but it is remarkable that as a general rule very few of the characteristic plants of the higher Andes should have been able to adapt themselves to the conditions of life on the plateaux of Patagonia.

The plants of the subtropical region have exhibited greater power of adaptation to new conditions. Of the larger trees none have been able to spread so far southward; and, except where planted and specially protected, it is not likely that they ever can do so. But of the small bushes and perennial herbs which make up the bulk of the flora a considerable number must be reckoned as more or less modified descendants of subtropical types. It is rather singular to note that this power of adaptation seems to be characteristic of certain groups or natural orders. The most marked instance is that of the *Leguminosæ*. In the Old World the tribes of this family characteristic of the tropics show no tendency to extend into the warm temperate zone, the only exceptions that suggest themselves to the writer being a few acacias in North Africa; whereas we find in this volume out of twenty-one species of indigenous Leguminosæ ten belonging to characteristic genera of the tropics, including two species of *Casalpinia* and one (new) species of *Mimosa*.

The condition of an extensive territory inhabited by a relatively small number of indigenous species, many of them probably but imperfectly adapted to their environment, was evidently very favourable for colonisation by new immigrants; and the chances in favour of the new comers were further increased on the introduction of agriculture and of domestic cattle from the Old World. The plough clears the ground from many bushes and

<sup>1</sup> "Informe Oficial de la Comision Cientifica agregada al Estado Mayor General de la Expedition al Rio Negro (Patagonia) bajo las ordenes del General D. Julio A. Roca." Entrega II. Botanica. (Buenos Aires, 1881.)

perennial herbs, and cattle make war on the species suitable for their food, and at the same time carry with them the seeds of many species adapted to such means of transport. To these causes we must attribute the wide diffusion of many plants, chiefly from southern Europe, introduced by man, either accidentally or intentionally, into the Argentine region and North Patagonia. A few of these appear to have spread beyond the bounds of European colonisation, but the majority seem to keep pace with the extension of the white race and of domestic cattle.

This volume, dated 1881 when it went to press, but not published till 1882, is very well printed and illustrated by twelve well-executed lithograph plates, in a manner creditable to the typographic resources of Buenos Ayres, and reflects honour on the administration of the republic: and on General Roca, who, as commander of the expedition, deserves the credit of associating with his staff several competent scientific men. We probably owe it mainly to his influence that the results have been given to the world in a manner so complete and satisfactory.

J. B.

#### ACROSS THE PAMPAS AND AMONG THE ANDES<sup>1</sup>

THE interest attaching to the confederation of South American provinces known as the Argentine Republic more than justifies Prof. R. Crawford in the publication of an account of his journeys across the Pampas and the Andes. Some fourteen years ago the Government of the Province of Buenos Ayres, foreseeing the vast importance of a line of railway which would connect the two oceans, entered into an agreement with the firm of Waring Brothers of London to send out a staff of engineers to explore and survey a route for a proposed Transandine railroad. Prof. R. Crawford was given the command, and, with his colleagues, left Liverpool in March 1871 for Monte Video, which was reached after a voyage of a month's duration. On landing, it was soon ascertained that matters were in desperate plight at Buenos Ayres. The frightful epidemic of yellow fever was still raging, the local Government had proclaimed public holidays and itself migrated to a distance from the doomed city, business of all sorts was suspended, and silence reigned in the streets. Under these circumstances, but for the pluck and energy of Prof. Crawford, the scheme for the survey across the Pampas would have come to an untimely end (that from the Chili side had commenced towards the end of April 1871); but he determined it should proceed, and never let the local authorities have any rest until all preliminaries were settled. In the meanwhile the enforced sojourn at Monte Video was not over pleasant. The city was in a state of siege, and it was not for some time after the arrival of the party that a temporary peace was patched up. Weary of the forced delay, Prof. Crawford and some members of his party visited Concordia and made a survey for the Salto Grande Canal. They passed, in their voyage up the Plate, Buenos Ayres, looking in the distance bright and pleasant, though death was stalking through it. In steaming up the Uruguay they saw Liebig's famed extract-of-beef factory at Fray Bentos, and McCall's vast establishment at Paysandu. In an account of a short excursion made from Concordia, we find the following interesting anecdote about the black vulture (*Cathartes atratus*) of La Plata; perhaps the coolness of the vulture's behaviour is fully equalled by the coolness of the driver in appropriating the stray horse:—

"The roads were very sandy, and the wheels sank deeply into them, making the carriage heavy to draw, so that the driver gladly appropriated a stray horse we met

upon the way that seemed inclined to join himself to ours, and having extemporised a rude set of harness with some spare pieces carried in reserve, attached him to our team, and drove off in triumph with this new acquisition.

"I was sitting on the box-seat with my gun in hand, when a black vulture came flying past, at which I fired, bringing it to the ground with a broken wing. The strange horse testified his dissatisfaction with the proceeding by the most violent plunging and kicking, that required all the driver's skill and address to overcome.

"When at last he was brought to a state of rest, due, no doubt, in a great measure to exhaustion, the wounded bird occupied our attention by the strange coolness of its proceedings. Regardless alike of our presence and an injured wing, to say nothing of the noise and confusion the horse had created, instead of attempting to escape, it walked quietly up to us, as if about to demand an explanation of the treatment it had received; then mounting deliberately on the wheel of the carriage, hopped in through the open window as composedly as if it were a regular passenger about to occupy an inside seat for which it had been booked in the ordinary manner.

"So offensive was the odour emitted by the unwelcome intruder that we could with difficulty bring ourselves to approach and dislodge it; and when we had done this, the vulture took refuge under the legs of the strange horse, frightening him to such a degree that he began again his strenuous endeavours to get loose, not stopping till he succeeded in smashing the harness to pieces, and escaping from his flapping foe.

"I am afraid that I was not popular that afternoon with my comrades and the driver, for my unlucky shot had entailed upon them much inconvenience and delay, so that it was late when we reached the estancia house."

Just as the survey of the canal was finished, traffic between Monte Video and Buenos Ayres was resumed, and, returning to the former place, the whole expedition left for Buenos Ayres on June 16, 1871. The city was still overwhelmed with gloom. Between 20,000 and 30,000 of its inhabitants had been buried within the few previous months out of a population of only 200,000 souls. Numerous houses had the plague spot still marked upon them, but in a very short time things looked more cheerful, and there were no outward tokens of the plague the city had passed through. Now began the negotiations for the necessary escort to accompany the expedition across the Pampas. While the expenses of the expedition were in great measure to be defrayed by the local Government of Buenos Ayres, it will be remembered that this Government has no national authority, nor could it undertake any outside its own territory, it was therefore necessary for the provincial Government to come to an understanding, which they did, with the national Government and with its neighbouring provinces, and with the Republic of Chili, for the passage of the expedition through these lands and for the supply of a military escort. "Along the whole route," the general commanding on the frontier reports to the President of the Republic (May 20, 1871), "there will be danger: the Indians were in a state of alarm that the objects of the Survey were to take more and more of their territories from them, and were determined to destroy the members of the expedition when possible," and the general calculated that an adequate force to properly protect the party from all danger should not number less than 1500 men perfectly equipped. Under these circumstances, and after some months' delay, the originally proposed route was abandoned, and a more northern one, in territory likely to be more free from the predatory attacks of the Indians, was adopted, and with a small escort the expedition left Buenos Ayres on August 17, 1871, and took up their quarters at Chivilcoy, 100 miles to the west of it; here final preparations were made for the formidable journey across the Pampas. The Chili expedition in the meantime had, before reaching the summit of the mountains,

<sup>1</sup> "Across the Pampas and the Andes." By Robert Crawford, M.A. With a Map and Illustrations. (London: Longmans, Green, and Co., 1882.)